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(54) An atomizer device for manually operated pumps

(57) An atomizer device for liquids pressurized by a manually operated pump, without pressurizers, comprises a nozzle (13) with an obturator (17) to which a plunger member (23) is connected. The liquid pressurized by the pump acts on this plunger (23) and moves the obturator (17) against a spring (29), opening the nozzle.

Interceptor means (20, 22), which allow the liquid to pass and consequently to be sprayed outwards only when the obturator (17) has moved by a given amount, moving away from the nozzle (13) and forming a predetermined chamber (19) about the nozzle, are provided in the passage for the liquid to the nozzle. The uniformity of the fan of the jet of liquid within the course of each operating cycle of the pump and its constancy in the different cycles is thus ensured.

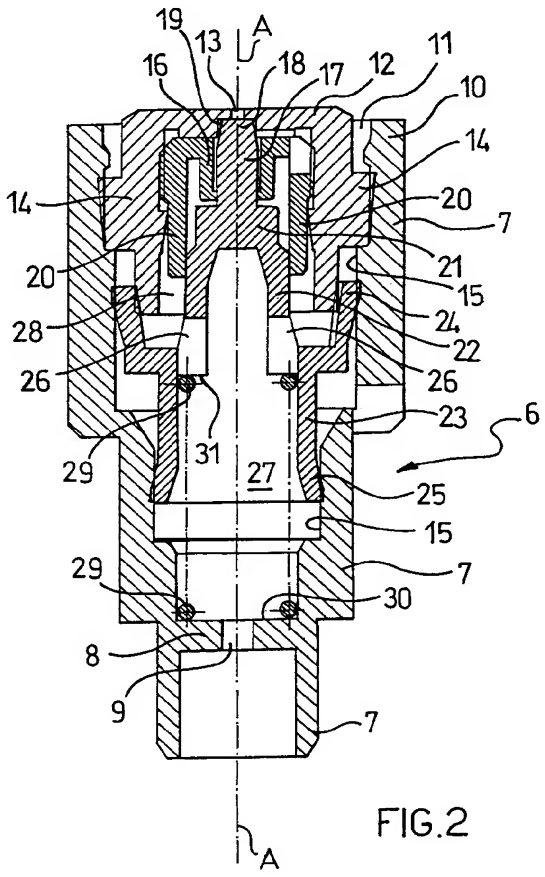

FIG.2

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The present invention relates to an atomizer device for liquids pressurized by a manually operated pump, comprising a hollow tubular support extending along a longitudinal axis and defining an internal cylindrical wall with a first axial opening at one end, for the intake of the liquid pressurized by the pump, and a second axial opening at the opposite end, a body provided with a nozzle arranged in correspondence with the second aperture and sealed tightly with the tubular support, an obturator, inside the support, for closing and opening the nozzle, a plunger member, cooperating with the cylindrical cavity in the tubular support, the plunger member being connected to the obturator for the axial movement thereof under the action of the pressure of the liquid determined by the pump, a guide sleeve for the obturator, a cavity through the sleeve and the body provided with the nozzle, the cavity facing the nozzle, a spring for urging the obturator against the nozzle and holding it closed with a predetermined resilient load, and a passageway for the liquid through the first aperture and the cavity facing the nozzle.

Atomizers having the above-mentioned characteristics are known in the prior art, one example being illustrated in the patent US-A-2 717 178.

Similar structures are also shown in the patent US-A-4 182 496 and in the European Patent Application EP-A-0 129 643.

In all the examples of atomizers described in the above documents, it can be seen that, when a specific pressure of the liquid to be delivered is reached, the obturator overcomes the resilient load of the spring and moves axially, opening the nozzle.

The nozzle being open, the liquid is immediately discharged outside without any control, under the effect of the pressure exerted by the pump which, being manual, generates a pressure which can vary widely in the range of an operating cycle and which changes from cycle to cycle when it has no pressurizing device.

This disadvantage is made worse by the fact that, in the prior art devices mentioned above, delivery occurs whilst the cavity is upstream of the nozzle and in the process of shaping and varying its geometry as a result of the gradual withdrawal of the obturator against spring loading.

It has, in fact, been found that, particularly when manually operated pumps without pressurizers are used, if the liquid is delivered before the chamber upstream of the nozzle has adopted a specific geometry and has reached a specific minimum volume, depending on the type of liquid to be delivered, it is not possible to repeat the desired fan shape of the sprayed jet constantly.

For each actuating cycle of the pump, the liquid can, in fact, be delivered initially in the form of a compact squirt and then, when the pump pressure reaches its maximum in the actuating cycle, in the form of a fan-shaped spray, returning to a compact squirt again when the pump pressure drops to zero at the end of the operating cycle.

It is thus a matter of a delivery in which the dimensions of the jet are neither constant nor uniform, with the result that there is an excessive consumption of liquid regardless of the surfaces sprayed.

The object of the invention is thus to eliminate the disadvantages encountered in atomizers of the prior art, permitting the creation of a fan-shaped spray which is uniform during each manual operating cycle of the pump and which is as constant as possible from one cycle to the next even when the pump does not have liquid pressurizing devices for equalizing its pressure during the pumping process.

The object is achieved by the invention which is characterized by the claims which follow.

The invention will now be described in greater detail with reference to a preferred embodiment illustrated in the appended drawings, in which:

- Figure 1 shows a schematic view of a pump-atomizer unit;
- Figure 2 shows a view in longitudinal section of the atomizer according to the invention with the obturator in the closed position;
- Figure 3 shows a view in section, like the preceding drawing, with the obturator moved away from the nozzle but with the path for the liquid still closed; and
- Figure 4 shows a view in section, as in the preceding drawings, with the nozzle open in the spraying state.

With reference to the above drawings, a pump of the type without pressurizers and manually operated by a trigger 2 and a return lever 3, is generally designated 1.

The pump, which is conventional, has a collar 4 for attachment to a container, not shown, for the liquid to be sprayed, and with a hood 5, shown partially in section in Figure 1, for protecting the mechanisms and for housing the atomizer device, generally indicated 6.

Possible further details of this pump and its operating mechanisms are to be found in the European Patent EP-A-0 449 046 in the name of the same applicant.

With reference to Figure 2, it will be noted that the atomizer device 6 comprises a tubular support 7 which extends along the longitudinal axis A-A. At its end 8, this support has a first axial opening 9 through which the liquid to be atomized enters, forced in cycles by the pump 1.

The other end 10 of the support 7 has a second axial opening 11 accommodating the body

12 carrying the nozzle 13.

The body 12 has an axial tubular extension 14 by means of which it is connected to the cylindrical inner wall 15 of the support 7 thus providing a tight seal.

A sleeve 16 for guiding the obturator 17 which, in the closed position illustrated in Figure 1, has its end 18 against the nozzle 13 in the cavity 19 in the body 12 and surrounds the nozzle 13, is mounted in a position which is concentric with the axis A-A inside the tubular extension 14 of the body 12.

The guide sleeve 16 has a tubular extension 20 which is connected externally to the tubular extension 14 and, internally, defines a cylindrical cavity the diameter of which is larger than the diameter of a first axial portion 21 of the obturator 17 and equal to that of the further axial portion 22 of the same obturator, facing the opening 9 of the tubular support 7.

Associated with the axial portion 22 of the obturator is a plunger member 23 which is hollow on the interior and the annular lips 24 and 25 of which sealingly engage the cylindrical inner surface 15 of the support 7.

The plunger member 23 has radial apertures 26 which put the interior 27 of the support 7 into communication with the cavity 28 surrounding the portion 22 of the obturator.

A spring 29, acting between the shoulder 30 of the support 7 and the shoulder 31 of the plunger member 23, holds the obturator 17 in the closed position of the nozzle 13 with a predetermined resilient load.

With particular reference to Figure 3, it can be seen that the cylindrical cavity 32 of the tubular extension 20 is put into communication with a plurality of radial channels 33 of the body 12 by means of the aperture 34 and an annular groove 35.

These radial channels 33 in turn communicate with the cavity 19 surrounding the nozzle 13 and serve to form a fan-shaped spray according to methods well known in the art.

As can be seen with particular reference to Figure 4, the axial cavity 27 in the support 7, the radial apertures 26 in the plunger member 23, the cavities 28 and 32, the aperture 34, the annular groove 35 and the radial channels 33 constitute a passageway for the liquid to be atomized, which puts the aperture 9 into communication with the nozzle 13.

In this passageway, the atomizer according to the invention provides for the presence of interception devices which, in the example illustrated, consist of the axial portion 22 of the obturator and of the tubular extension 20 of the guide sleeve 16.

In the closed position of the nozzle shown in Figure 2 and in the open position of the nozzle, with the obturator withdrawn outside the cavity 19 surrounding the nozzle, the portion 22 is, in fact, always sealingly engaged with the inner wall of the tubular extension 20 in spite of the movement of the obturator and the opening of the nozzle.

The interception of the passageway is interrupted and the liquid can reach the nozzle 13 from which it is sprayed outwards by the action of the pump only in the position illustrated in Figure 4, in which the obturator is subsequently withdrawn and the first axial portion 21 of the obturator is opposite the cavity 28.

As can be seen from the above, during its use, the atomizer does not deliver any liquid until, by the manual operation of the pump trigger 2, not only is sufficient pressure reached to overcome the thrust of the spring 29 and the friction associated with the plunger member 23 and to disconnect the obturator 18 from the nozzle 13 so as to open it, but a minimum movement is reached which is predetermined by the obturator such that the cavity 19 about the nozzle is also released, the geometry of which cavity is provided so as to be sufficient to ensure that the jet of liquid delivered is fan-shaped.

At the same time, during the course of the operating cycle of the trigger 2, the pump has reached the point at which it imparts a sufficiently high pressure to the liquid for it to be ejected in the form of a spray.

Thus, with the atomizer according to the invention it is possible to use manual pumps, even of the type with a trigger and without pressurizers, which are simple and economic, making the best use of the levels of the pressure generated as a function of the movement of the operating trigger in every operating cycle.

The invention permits numerous modifications and variants, in particular in connection with the means for intercepting the passageway for the liquid between the aperture 9 and the nozzle 13.

In a possible alternative embodiment, these means can consist, for example, of radial holes passing through the tubular extension 20 which are covered and uncovered by the portion 22 of the obturator during its axial movement without moving this portion 22 beyond the extension 20.

Claims

1. An atomizer device for liquids pressurized by a manually operated pump (1), comprising a hollow tubular support (7) extending along a longitudinal axis (A-A) and defining an internal cylindrical wall (15) with a first axial opening (9) disposed at one end (8), for the intake of liquid pressurized by the pump, and a second axial aperture (11) disposed at the opposite end, a body (12) provided with a nozzle (13)

positioned in correspondence with the second aperture (11) of the tubular support and tightly sealed with the latter, an obturator (17), inside the support, for closing and opening the nozzle (13), a plunger member (23) cooperating with the cylindrical cavity (15) of the tubular support, the plunger member (23) being connected to the obturator (17) for the axial movement of the latter under the action of the pressure of the liquid determined by the pump (1), a guide sleeve (16) for the obturator (17), a cavity (19) between the sleeve (16) and the body provided with a nozzle (12), the cavity (19) being opposite the nozzle, a spring (29) for urging the obturator (17) against the nozzle (13) and keeping it closed with a predetermined resilient load, as well as a passageway (27, 26, 28, 32) for the liquid between the first aperture (9) of the tubular support and the cavity (19) facing the nozzle, characterized in that the passageway includes interceptor means (20, 22) operated by the obturator (18) which keep it closed when the obturator (17) is against the nozzle (13) and open it after a predetermined axial movement of the obturator during the movement away from the nozzle.

2. An atomizer device according to Claim 1, characterized in that the interceptor means comprise a tubular extension (20) for the guide sleeve (16) for the obturator coaxial with the obturator itself and facing the first aperture (9) of the support (7), the tubular extension (20) having an internal wall provided with a predetermined diameter, a first axial portion (21) of the obturator having a diameter which is smaller than the internal diameter of the tubular extension (20) and a second, likewise axial, portion (22) of the obturator, following the first, towards the first aperture (9) of the support, having a diameter equal to the internal diameter of the tubular extension (20) so as to determine a seal between the second portion (22) of the obturator and the internal wall of the extension (20) when the obturator (17) is in the closed position and at least until the end of the predetermined axial movement.

3. A device according to Claims 1 and 2, characterized in that the cavity (19) facing the nozzle (13) extends axially for a portion substantially equal to the predetermined axial movement of the obturator.

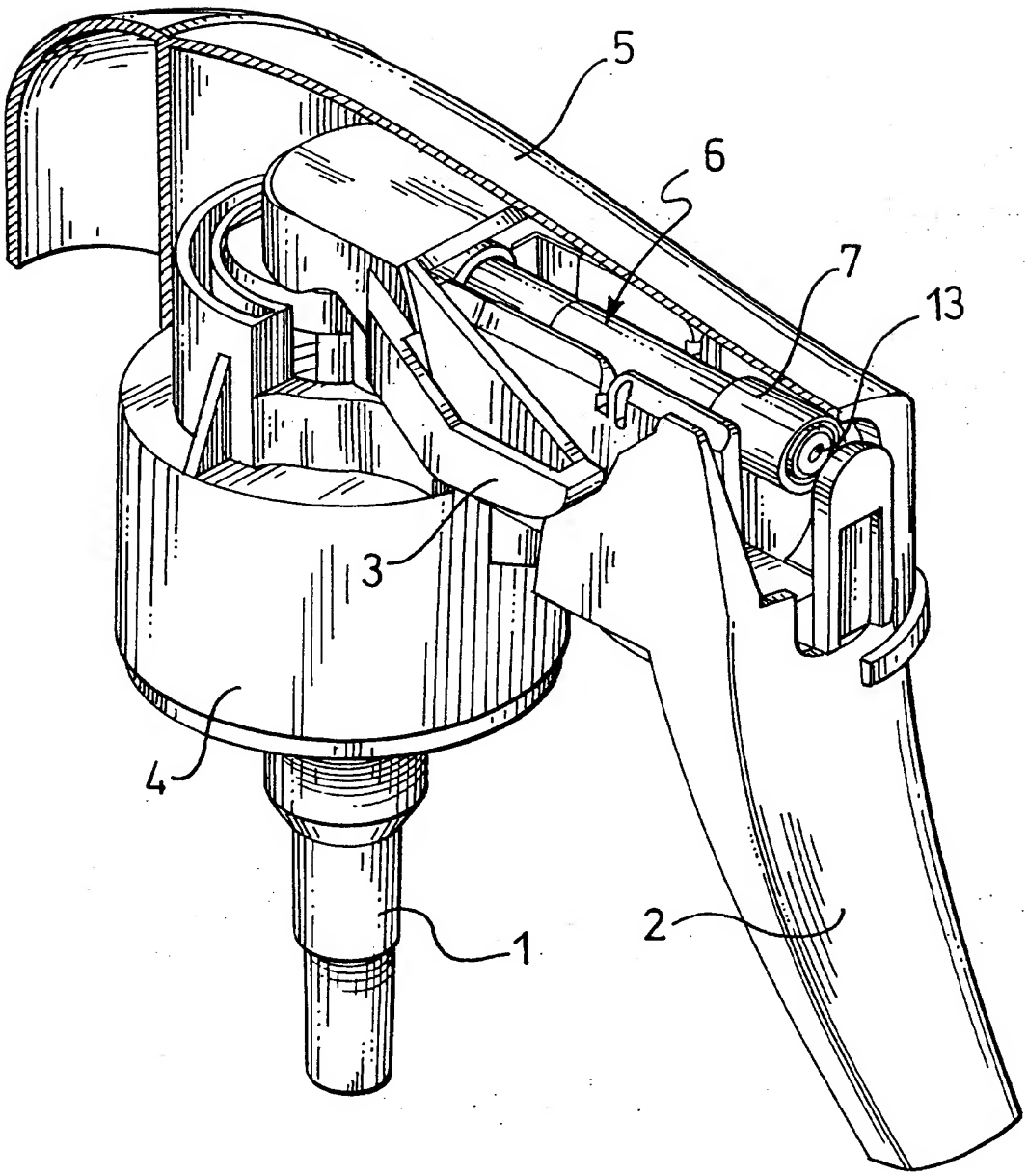

FIG.1

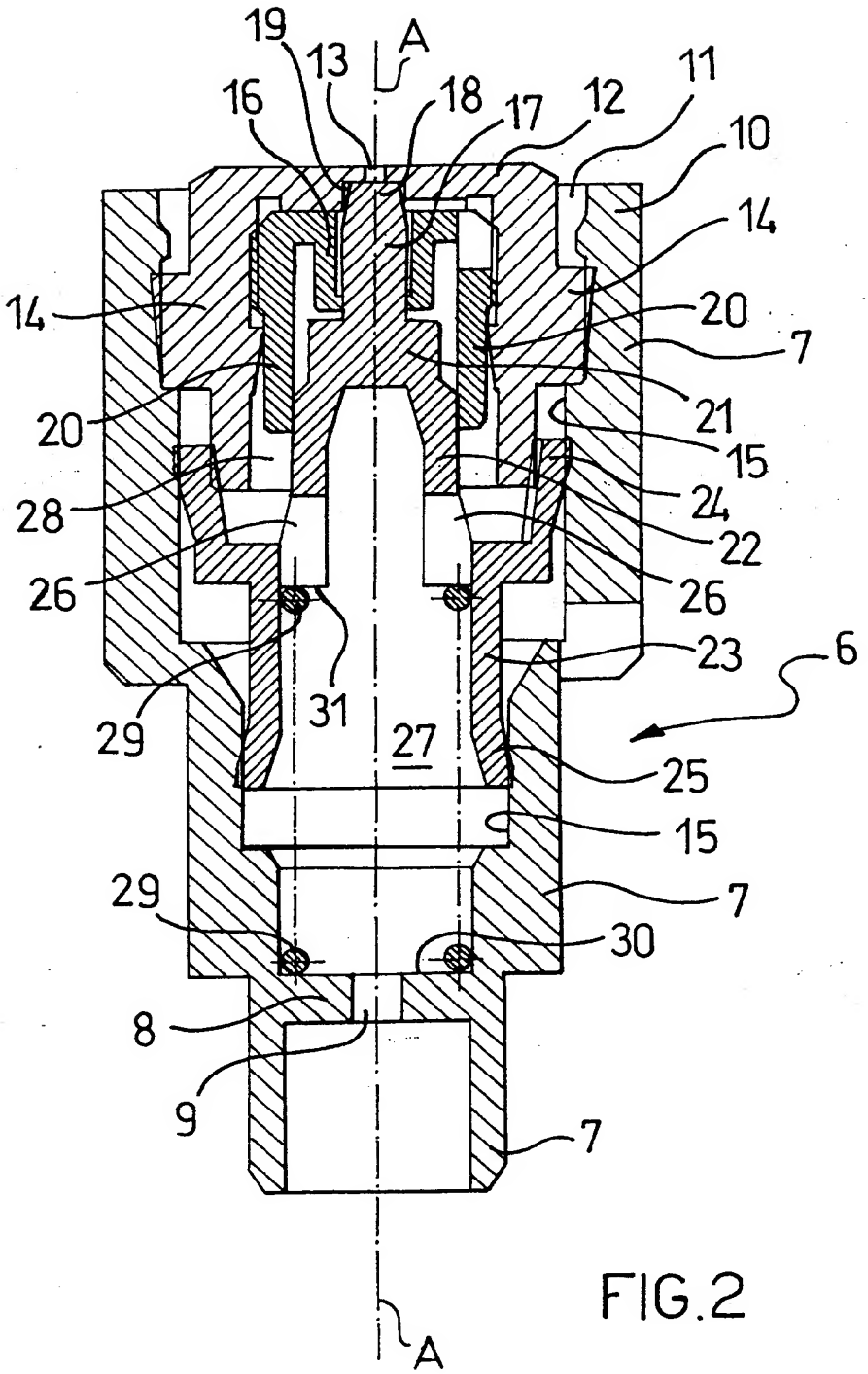
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FIG.2

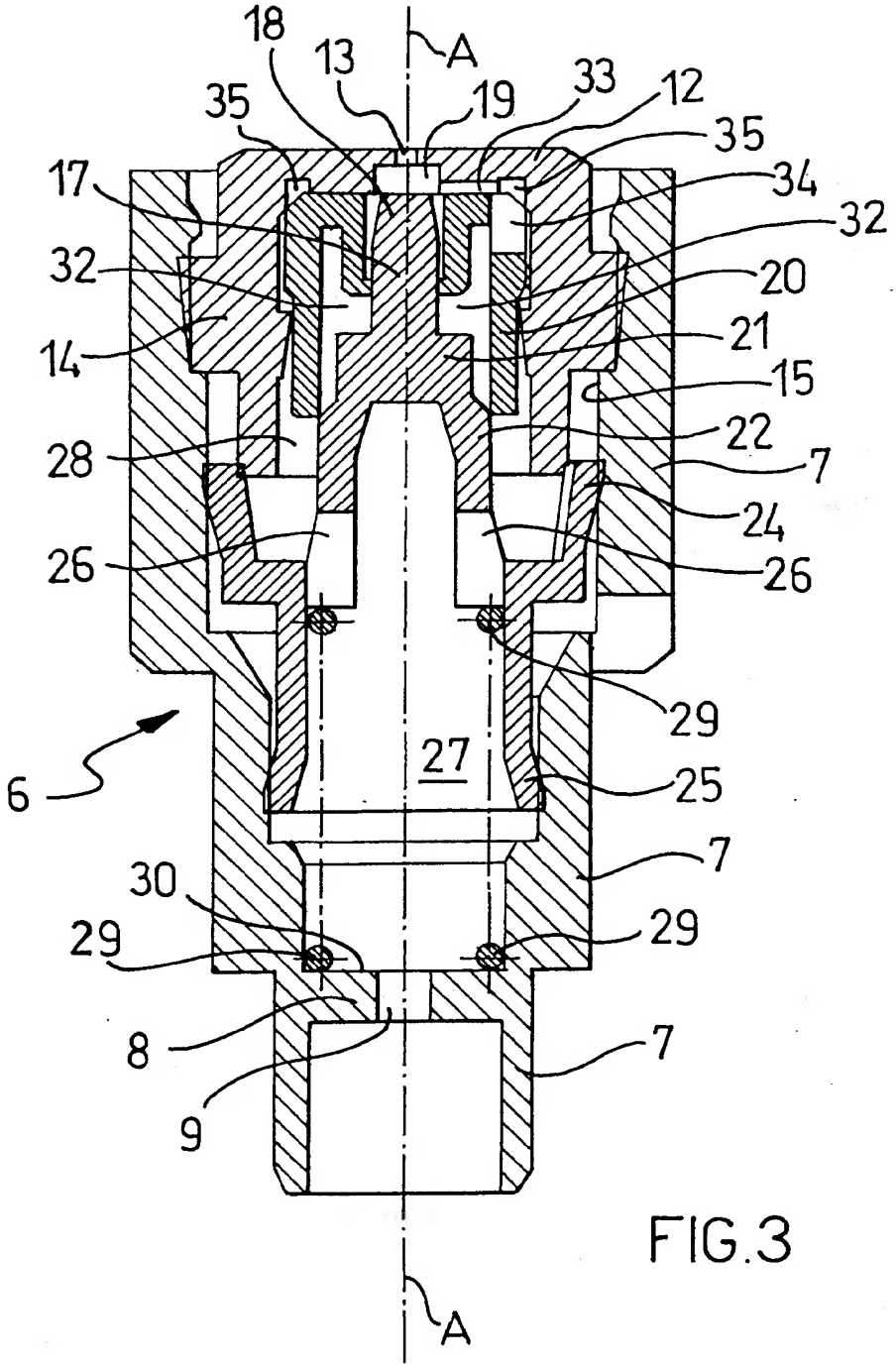
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FIG.3

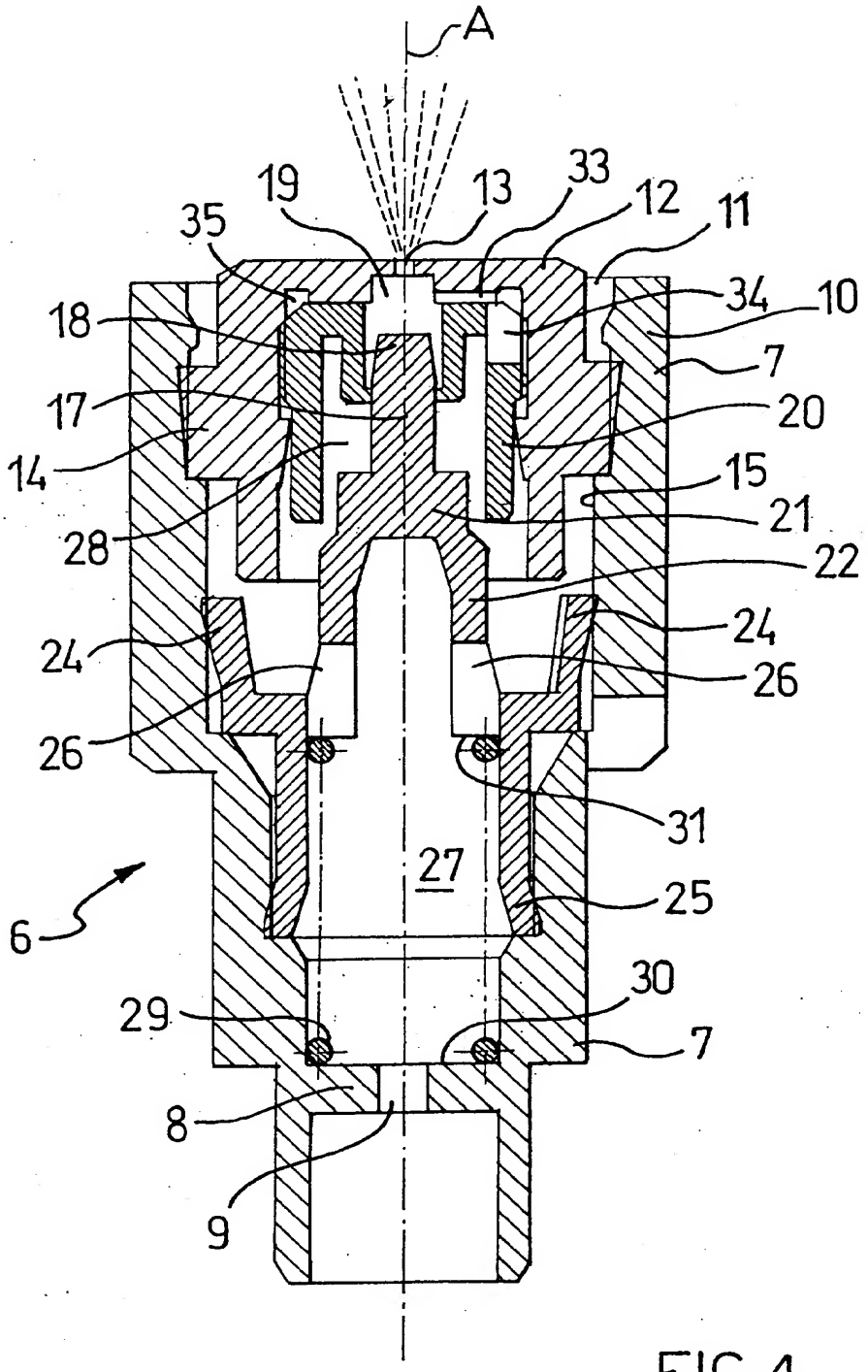
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FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0140

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	US-A-4 182 496 (BURKE) * the whole document * ---	1	B05B11/00
A	FR-A-1 486 392 (RUDOLF ALBERT) * page 1, right column; figures * ---	1	
A	EP-A-0 289 856 (ING. ERICH PFEIFFER GMBH & CO. KG) * column 7, line 1 - line 21; figures * ---	1,3	
A	FR-A-2 366 068 (AERO-PUMP G.M.B.H.) -----		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 August 1994	Brévier, F

CATEGORY OF CITED DOCUMENTS

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